Claims

1. A method of preparing an article surface comprising the steps of:

providing at least two fluids of differing densities such that a fluid interface exists between each fluid layer;

providing one or more articles with one or more reactive components on a surface of one or more of the articles having a greater affinity or solubility to one of the at least two fluids;

positioning the one or more articles into the at least two fluids; and

treating one or more of the reactive components on the article surface by passing the article through at least one fluid interface vertically, horizontally, or at any other orientation.

2. The method of claim 1 wherein in the step of providing an article with a reactive component on the surface of the article having a greater affinity or solubility to one of the at least two fluids, the one of the at least two fluids having a greater affinity or solubility to the reactive component has a higher density than another of the at least two fluids.

3. The method of claim 2 wherein the step of providing at least two fluids of differing densities comprises providing water and chloroform such that the reactive component comprising water or water soluble contaminants will remain in a water layer when the article is passed through the fluid interface into a chloroform layer and further including the step of removing the water layer prior to removing the article.

4. The method of claim 1 wherein in the step of providing an article with a reactive component on a surface of the article having a greater affinity or solubility to one of the at least two fluids, the one of the at least two fluids having a greater affinity or

solubility to the reactive component has a lower density than the other of the at least two fluids.

5. The method of claim 4 wherein the step of providing at least two fluids of differing densities comprises providing water and ether such that the reactive component comprising water or water soluble contaminants will remain in a water layer when the article is passed through the fluid interface.

6. The method of claim 1 wherein the step of providing at least two fluids of differing densities includes providing a pressurized gas.

7. The method of claim 1 wherein the step of treating the reactive component comprises etching the reactive component on the article surface by positioning the article in the fluid having a greater affinity or solubility for the reactive component, such fluid being denser than another of the at least two fluids.

8. The method of claim 1 further including the step of terminating the treating step by extracting the article through the fluid interface into another of the at least two fluids having substantially no affinity to the reactive component.

9. The method of claim 1 further including the step of terminating the treating step by removing one of the at least two fluids having substantially no affinity to the reactive component.

10. The method of claim 1 wherein in the step of providing an article with a reactive component, the reactive component having a greater affinity or solubility to a fluid having a higher density than another of the at least two fluids, and wherein the step of positioning the article into the at least two fluids comprises positioning the article into

the at least two fluids with agitation or energy input which is periodic in time, or any combination thereof and further including the step of ceasing the agitation and passing the article through the fluid interface.

11. The method of claim 1 wherein the step of providing an article with a reactive component, the reactive component having a greater affinity or solubility to a fluid having a higher density than another of the at least two fluids, and wherein the step of positioning the article into the at least two fluids comprises positioning the article into the at least two fluids with mixing at an elevated temperature and further including the steps of ceasing the mixing at an elevated temperature and cooling the fluids such that the fluid having a higher density with an affinity for the reactive component settles and passing the article through the fluid interface.

12. A method of preparing a workpiece surface comprising the steps of:

providing a reaction vessel having a first inlet/outlet means located at a bottom of the vessel and a second inlet/outlet means located above the first outlet means;

providing a first fluid into the reaction vessel;

providing at least one other fluid into the reaction vessel, the at least one other fluid having a higher density than the first fluid such that a fluid interface exists between a first fluid layer and an at least one other fluid layer;

providing a workpiece having a surface component having a greater affinity or solubility to either the first fluid or the at least one other fluid;

submerging the workpiece into the reaction vessel having the first fluid and the at least one other fluid such that the workpiece is below the fluid interface;

treating the surface component by passing the workpiece through the fluid interface; and

terminating the treating step.

13. The method of claim 12 further including the step of providing another fluid into the reaction vessel having a different density than either the first fluid or the at least one other fluid.

14. The method of claim 12 wherein the step of providing a workpiece having a surface component comprises providing a workpiece having a surface component having a greater affinity or solubility to the first fluid and the step of submerging the workpiece into the reaction vessel comprises positioning the workpiece in the at least one other fluid layer such that during the step of treating the surface component, the surface component remains in the first fluid layer.

15. The method of claim 12 wherein the step of providing a workpiece having a surface component comprises providing a workpiece having a surface component having a greater affinity or solubility to the at least one other fluid and the step of treating the surface component comprises passing the workpiece through the fluid interface into the at least one other fluid layer such that the surface component is treated with the at least one other fluid layer.

16. The method of claim 15 wherein the step of terminating the processing step comprises lifting the workpiece through the fluid interface into the first fluid which has substantially no affinity for the surface component.

17. The method of claim 12 further including the step of heating the first fluid and at least one other fluid into solution after submerging the workpiece into the reaction vessel such that upon cooling, the first fluid layer and the at least one other fluid layer are immiscible with the fluid interface present and the surface component is substantially present in only one of the fluid layers.

18. The method of claim 12 further including the step of agitating the first fluid and the at least one other fluid after submerging the workpiece into the reaction vessel such that upon ceasing agitation, the first fluid layer and the at least one other fluid layer are immiscible with the fluid interface present and the surface component is substantially present in only one of the fluid layers.

19. The method of claim 12 wherein the step of providing a workpiece having a surface component comprises providing a workpiece wherein the surface component is water and wherein the first fluid comprises water such that the step of treating the surface component occurs when the workpiece is passed through the fluid interface into the at least one other fluid layer wherein the surface component remains the first fluid layer.

20. The method of claim 12 wherein the step of treating the surface component comprises etching the surface component from a surface of the workpiece and wherein the step of terminating the treating step by passing the workpiece through the fluid interface comprises a rapid etch stop.

21. The method of claim 13 wherein the step of terminating the treating step comprises removing the first fluid from the reaction vessel.

22. The method of claim 12 wherein the steps of providing a first fluid or the at least one other fluid comprises providing a pressurized gas.

23. A method of removing water and water soluble impurities from a workpiece surface comprising the steps of:

providing a reaction vessel containing water;

providing at least one fluid having a different density than the water such that predominant fluid layers and a water layer exists with a fluid interface between each fluid layer and the water layer;

passing the workpiece through the at least one fluid interface; and

stripping the water and water soluble impurities from the workpiece surface as the water and water insoluble impurities remain in the water layer.

24. The method of claim 23 further including the step of removing the water layer from the reaction vessel when the step of stripping the water and water soluble impurities is substantially completed if the workpiece is positioned below the water layer.

25. A method of removing a surface component from a workpiece surface comprising the steps of:

providing an etchant fluid;

providing at least one fluid immiscible with the etchant fluid having a different density than the etchant fluid;

positioning the workpiece in the etchant solution to facilitate etching of the surface component; and

terminating etching of the surface component when the workpiece is passed through the fluid interface into the at least one fluid immiscible with the etchant fluid.

26. The method of claim 25 wherein the step of providing at least one fluid immiscible with the etchant solution comprises providing two fluids immiscible with the etchant solution, both fluids having a lower density than the etchant solution and immiscible with each other such that a first fluid interface exists between the two fluids and the etchant solution and a second fluid interface exists between the two fluids.

27. The method of claim 26 wherein the step of terminating etching of the surface component comprises passing the workpiece through the first fluid interface into one of the two fluids.

28. The method of claim 26 wherein the step of terminating etching of the surface component comprises drawing the workpiece through the first fluid interface to provide a rapid etch stop and further including the step of passing the workpiece through the second fluid interface such that a protective coating is formed on a surface of the workpiece.

29. An apparatus for preparing a workpiece surface utilizing multiple fluids comprising:

an open vessel;

one or more interior partitions extending between interior walls of the vessel within a top portion of the vessel without extending to a bottom surface of the vessel creating at least two chambers such that multiple liquid interfaces are created when the vessel is filled with a high density fluid above a bottom surface of the partition and one or more fluids of lower density are poured into each of the chambers.

30. The apparatus of claim 29 further including one or more interior partitions extending from a bottom portion of the vessel alternating with the one or more interior partitions extending between the interior walls of the vessel such that the vessel may be filled with more than one high density fluid above a bottom surface of the partition yet below a top portion of the partition extending from a bottom portion of the vessel.